

E-Jobsheet Based on Mobile Pocket Book as Digital Learning Resources (DLRs)

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INTISARI

Penelitian ini bertujuan untuk mengembangkan *e-jobsheet* berbasis *mobile pocket book* berupa buku saku digital pada mata kuliah algoritma dan pemrograman dasar. Penelitian ini merupakan penelitian *Research & Development (R&D)* dengan model pengembangan 4D (Define, Design, Develop, Disseminate). Instrumen penelitian dalam mengumpulkan data digunakan angket validasi, angket respon, dan wawancara tidak terstruktur kepada pengguna saat uji coba skala kecil. Analisis data yang digunakan dalam penelitian ini adalah analisis data deksriptif dengan pendekatan kuantitatif. Berdasarkan hasil validasi dari aspek media dan materi maka diperoleh tingkat validitas produk secara keseluruhan sebesar 85,46% dengan kategori valid, tingkat respon mahasiswa dalam uji coba skala kecil terhadap *e-jobsheet* diperoleh sebesar 86% dengan kategori sangat baik. Maka, dapat dinyatakan bahwa *e-jobsheet* berbasis *mobile pocket book* yang dikembangkan valid dan layak untuk digunakan.

Kata kunci: E-Jobsheet, Mobile Pocket Book, Sumber Pembelajaran Digital, Algoritma Pemrograman

ABSTRACT

This study aims to develop an e-jobsheet based on a mobile pocket book in the form of a digital pocket book on algorithms and basic programming courses. This research is a Research & Development (R&D) research with a 4D development model (Define, Design, Develop, Disseminate). The research instrument in collecting data used validation questionnaires, response questionnaires, and unstructured interviews to users during small-scale trials. The data analysis used in this research is descriptive data analysis with a quantitative approach. Based on the validation results from the media and material aspects, the overall product validity level is 85.46% with a valid category, the student response rate in a small-scale trial of the e-jobsheet is 86% with a very good category. So, it can be stated that the e-jobsheet based on the mobile pocket book that was developed is valid and feasible to use.

Keywords: E-Jobsheet, Mobile Pocket Book, Digital Learning Resources (DLR), Algorithm & Programming



INTRODUCTION

Teaching materials are all forms of materials that are systematically arranged which function to assist educators and students in carrying out the learning process [1][2]. The online learning process during the COVID-19 pandemic provides new challenges for educators, especially lecturers, in developing teaching materials [3]. The success of the learning process is certainly influenced by many factors, both internal and external, one of which is the availability of teaching materials. Teaching materials are very important for students, especially in increasing their understanding of the

material to be discussed [4]. Teaching materials are also an important aspect that must be prepared by lecturers in carrying out online learning [3]. In the basic algorithm and programming courses, all learning activities are carried out online using e-learning [5]. E-learning is provided by the campus, and lecturers are required to fill in the e-learning with learning content before the lecture starts. Learning content related to algorithms and programming is currently still in the form of printed books or practicum modules in PDF format. However, the modules provided are still considered less attractive to students because the modules are

text-based and static images. Based on interviews with several students who took the basic algorithm and programming courses stated that the practicum module is in the form of a PDF file with a simple layout and contains only reading material. Modules like this tend to make students feel bored and find it difficult to understand the material independently, as a result it has an impact on student learning outcomes [6]. Therefore, it is necessary to develop this jobsheet in the form of a digital version which is equipped with various learning multimedia in it.

Based on these problems, in order to improve students' understanding in learning algorithms and basic programming, maintain and improve student learning outcomes, it is necessary to provide digital learning resources that support online learning models with e-learning. One of them is by developing an E-jobsheet in the form of a digital pocket book which can be accessed using a smartphone device as a supporting medium or a supplement in online learning for algorithms and basic programming courses [7]. The developed e-jobsheet must meet certain criteria. In developing a digital teaching material, it is necessary to have the following five characteristics, including self-instruction, self-contained, stand-alone, adaptive, and user friendly [8]. In addition, digital teaching materials need to be designed with aesthetics to make it more attractive to students, and interactively equipped with various multimedia technologies [9].

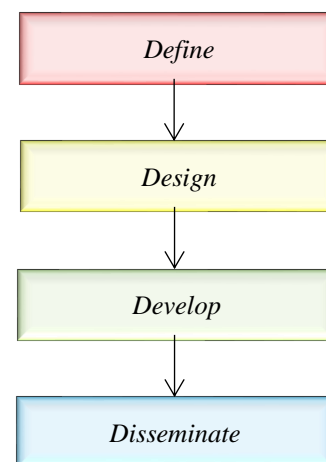
Meanwhile, the increasingly rapid development of mobile technology makes students more comfortable with all things that can be managed in one handheld device, namely a smartphone [10][11]. Based on the results of questionnaires distributed using google form, it is known that all students in the algorithm and basic programming class have mobile devices, and all students prefer to search for subject matter using smartphones and the internet rather than reading books in the library. Based on the characteristics of these students, the development of an E-jobsheet in the form of a mobile-based digital pocket book is in line with the needs and habits of students as users.

The e-jobsheet which will be developed in the form of a mobile pocket book will contain learning materials for algorithms and basic programming which is equipped with learning links as an additional reference in understanding the material in more depth, then there will also be pictures,

animations, and learning videos, learning quizzes. [7]. The advantage of this mobile pocket book is that it can be read by students anytime and anywhere using a smartphone and without internet [12]. So, based on this, the researchers tried to develop an E-jobsheet based on a mobile pocket book as a digital learning media for the algorithm and basic programming courses at the Informatics Engineering Education Study Program, Faculty of Engineering, Universitas Negeri Padang.

METHOD

This research is a type of research and development (R&D). R&D is a research method used to research, develop and test the effectiveness of a particular product. Then, the development model used in this research and development is a 4D development model or 4D model or known as four-D. The 4D development model consists of 4 (four) main stages, namely: 1) Define (defining), 2) Design (design), 3) Develop (development), and 4) Disseminate; as can be seen in Figure 1 below[13]:



Gambar 1. 4D Model [14]

This research was carried out since March – September, for data collection from July to August 2021. The subjects of this research are validators and students as respondents. The validator consists of media and material validators, then the respondents are 30 research sample students who are used as respondents. The sampling technique uses purposive sampling [15]. Data collection techniques in the form of validation questionnaires, respondent questionnaires and unstructured interviews. The questionnaire was compiled using a Likert scale with a maximum score of (5) and a minimum score of (1) [2]. The following is the questionnaire rating scale table:

Table 1. Questionnaire Rating Scale

Score	Criteria Assessment
5	Very good
4	Well
3	Pretty good
2	Poor
1	Not Good

The data analysis technique used was quantitative and qualitative descriptive data analysis. For quantitative analysis use the following formula [16]:

$$\text{Percentage} = \frac{\text{Score}}{\text{Max Score}} \times 100\%$$

Then the category of the results of the percentage of validity is based on the following table 2:

Table 2. Category Validation Test

No.	Percentage Inteval	Category
1	65 - 100%	Valid
2	0 - 64%	Invalid

The categories of student response rate results are based on the following table 3:

Table 3. Student Response Category

No.	Percentage Inteval	Category
1	81% - 100%	Very good
2	61% - 80%	Well
3	41% - 60%	Pretty good
4	21% - 40%	Poor
5	0% - 20%	Not Good

RESULTS AND DISCUSSION

This research produces a product in the form of an E-jobsheet based on a mobile pocket book as a digital learning source for algorithms and basic programming that can be accessed anytime and anywhere using a mobile device (smartphone). The model used in the development is 4D model [17], The stages of development are as follows:

1. Define

At this stage is the stage of research and gathering information about the problems that

occur in the field, what products are needed to overcome the problems. At this stage, a literature study was conducted on the development of E-jobsheets as a digital learning medium, then conducted interviews with several students related to the learning content in e-learning.

Based on the results of the questionnaire distributed via google form, it can be seen that all students who take the algorithm and basic programming class have mobile devices, namely smartphones based on Android and IOS, then it is also known that as many as 86% of students browse using smartphones more often than laptops and computers, 88% of students stated that they rarely visited the library, 77% of students stated that the basic algorithm and programming worksheets in e-learning were less interesting and difficult to understand independently, and all students stated that it was difficult apart from the use of smartphones, so they felt it was very necessary and in line with the development of a smartphone. This mobile pocket book-based e-jobsheet is an independent digital learning resource that can be used by students as a learning supplement without having to be limited by space and time.

2. Design

The developed e-jobsheet consists of 14 main materials according to the semester learning plan that has been prepared. Cover design on E-jobsheets using Adobe Illustrator, preparation of materials using Microsoft Word, Nitro PDF & PDF Professional, video tutorials on programming using Active Presenter. At this stage, a validation test questionnaire was also prepared from the media and material aspects to be filled out by the validator and response questionnaires from the respondents.

3. Develop

This stage is the initial development stage of the product. In the developed E-jobsheet, there are several navigations that will assist users in using the E-jobsheet, then all materials, quizzes, and learning videos have been made into a unified whole in the form of a digital pocket book with the title E-Jobsheet Algorithms and Basic Programming. The initial view is as follows as shown in Figure 2.



Figure 2. Initial Display of E-Jobsheet

The following is the appearance of the E-jobsheet when accessed using a smartphone and tab (Figure 2 and Figure 3).



Figure 3. Display on Smartphone



Figure 4. Display on Android Tab

In the footer section of the application there are several navigation buttons such as viewing the detailed list of materials as shown in Figure 5, as well as several navigations that assist users in using the E-jobsheet such as buttons to continue to the previous and next pages, as well as buttons to enlarge the view.

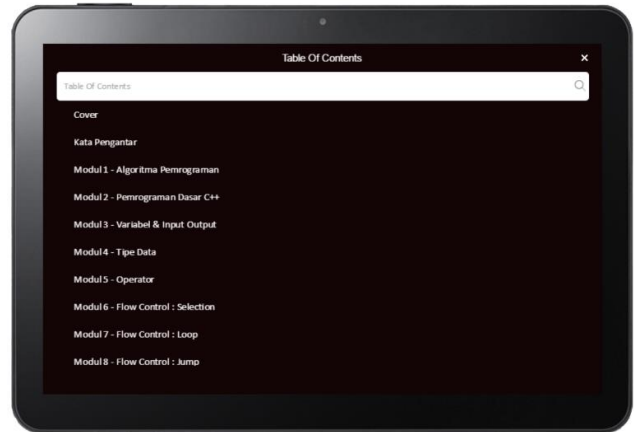


Figure 5. Display of Table of Contents

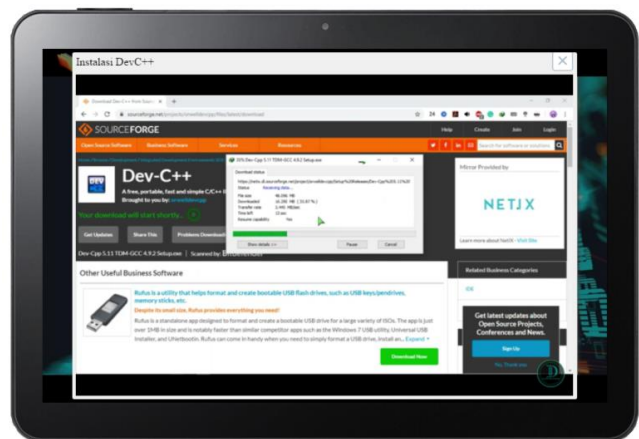


Figure 6. Learning Video Display

In Figure 6 is a display of the learning video contained in the developed E-jobsheet. Furthermore, validation is carried out by 3 validators using a validity test questionnaire that has been prepared. The following are the results of the initial product validation test:

a) Media Validation

Media validation to determine the feasibility of the product from the aspect of appearance, navigation, and ease of use. In media validation, the following results are obtained:

Table 4. Media Validation Test Results

No.	Aspect	Percentage	Category
1	User Interface	89%	Valid
2	Navigation	77%	Valid
3	Usability	85%	Valid
Average		83,67%	Valid

Table 5. Media Expert Comments and Suggestions

No.	Media Expert	Comments & Suggestions
1	V1	Add animation effect when the user cursor is on the button.
2	V2	The color of the button should be made more striking.
3	V3	The color of the button is replaced with several colors according to its function.

Based on comments and suggestions the validator refers to the button, namely the navigation button, so that improvements are made to the appearance of the button by adding an animation effect when the cursor is in the navigation area, and dividing the button into three color variations, namely red, yellow, and blue. The red color is for the learning video button, the yellow color is for the quiz button, and the blue color is for the download button. However, based on the validation table, it can be stated that the average total value of the validation percentage from media experts is 83.67%, so it can be concluded that the E-jobsheet based on the mobile pocket book developed is categorized as valid.

b) Material Validation

Material validation aims to determine the suitability of the material with learning outcomes, presentation of material, presentation of learning videos, readability. The validation process is carried out by 3 validators. In material validation, the following results are obtained:

Table 6. Material Validation Test Results

No.	Aspect	Percentage	Category
1	Material Suitability	90%	Valid
2	Contents	94%	Valid
3	Video Presentation	85%	Valid
4	Readability	80%	Valid
Average		87,25%	Valid

Table 7. Material Expert Comments and Suggestions

No.	Material Expert	Comments & Suggestions
1	V1	The font size of the material is made a little bigger
2	V2	The font size is good, but it's a bit unclear
3	V3	The special font size for the material section should be slightly enlarged

Based on the comments and suggestions of the validator, it refers to the font size used, which is 10pt, so improvements were made by changing the font size to 12pt. Based on the table, the average total percentage value of the material aspect is 87.25% with a valid category.

So, from the validation test table, the overall validity test results can be calculated, from the media and material aspects of:

Table 8. Overall Validation Results

No.	Aspect	Percentage	Category
1	Media	83,67%	Valid
2	Material	87,25%	Valid
Overall Validation		85,46%	Valid

This shows that the E-jobsheet based on the mobile pocket book algorithm and basic programming from the media and material aspects is valid and feasible to use.

4. Disseminate

Furthermore, the product is distributed to students as users and to find out how students respond to the developed E-jobsheet, a response questionnaire is distributed via google form at the end of the semester to collect information related to student responses to electronic worksheets. The trial was conducted on 30 students who were students of the Informatics Engineering Education Study Program, Faculty of Engineering, Universitas Negeri Padang who took the Algorithm and Basic Programming courses. The following are the results of the questionnaire responses from respondents in Table 9:

Table 9. Student Response Questionnaire Results

No.	Aspect	Percentage	Category
1	Navigation	86%	Very good
2	Contents	89%	Very good
3	Interests	83%	Very good
Average		86%	Very good

Table 10. Student Comments and Suggestions

No.	Aspect	Comments & Suggestions
1	Navigation	All navigation buttons can work very well.
2	Contents	The color of the button should be made more striking.
3	Interests	The color of the button is replaced with several colors according to its function.

The improvement phase of the e-jobsheet is carried out on an ongoing basis based on suggestions and input from students who have used mobile pocket book-based E-jobsheets in online learning.

CONCLUSION

E-jobsheet based on mobile pocket book which was developed as an additional learning medium for basic programming and algorithm courses obtained an overall validity test result of **85.46%** in the **valid** category, with a student response rate of **86%** for the E-jobsheet with the response category being **very good**.

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